

REMARKS

Claims 1-11 are active in the application.

5 The drawings were objected to because they did not include indicia mentioned in the specification. In fact, the error was actually in the specification. In the specification, roller "44" has been changed to roller "6", and switch "12" has been changed to switch "10", which are properly shown in the drawings.

10 The specification on page 15 line 2 has been corrected pursuant to the Examiners requirement. In addition, various grammatical errors have been corrected. No new matter has been added.

Claims 1 and 7 have been amended to more clearly claim the invention. No new matter has been added.

15 Claims 1-2 and 7-8 were rejected under 35 U.S.C. 102(e) as being anticipated by US patent 6,330,083 to Nabeshima et al. and claims 3-6 and 9-11 were rejected for obviousness under 35 U.S.C. 103. Both of these rejections are traversed on the grounds that none of the claims, as amended, are anticipated by or obvious over the Nabeshima reference.

20 Claims 1 and 7, as amended, each include the limitations of "detecting an ambient temperature" and "controlling a drive signal according to detected ambient temperature". In the present invention, ambient temperature is detected, and the detected ambient temperature is used to control a drive signal for cold-cathode-light source, for example, by varying current, voltage or duty cycle. In a scanner according to the present invention, this provides the substantial benefit of preventing ambient temperature-induced variations in lamp brightness, which can cause poor scanning performance. Locating the
25 temperature detector away from the lamp provides the additional benefits of increased space for the temperature detector circuit and freedom in circuit design.

In order to provide the above benefits, the temperature sensor (e.g. thermistor) must be located away from devices having large heat generation (e.g. such as the cold cathode lamp), as this would prevent the accurate detection of the ambient temperature.
30 This is taught in the specification at page 8, lines 10-12, which state: "The thermistor 15 is positioned at any place for detecting ambient temperatures, *except places with large*

heat dissipation.". Additionally, page 15, lines 10-15 specifically teach that the thermistor is located away from the cold-cathode light: "According to the present invention, the temperature detection element that detects only the ambient temperature, *not being the temperature of the cold-cathode-tube light source*, can be provided at any places, except places with large heat dissipation within the system". So, according to the present invention as described in the specification and as claimed (due to the limitation 'ambient'), the temperature detector is necessarily located away from the cold-cathode light or other sources of heat so that the true ambient temperature is detected.

The teachings of Nabeshima et al. are, by comparison, very different from the present invention as claimed in claims 1 and 7 in three ways: (1) Nabeshima et al. detect the temperature of the lamp tube wall, not the *ambient* temperature as defined in the present invention, (2) Nabeshima et al. use the detected temperature to adjust power to a *heater* for maintaining the lamp at a constant temperature, not for controlling a drive signal or power to the lamp, and (3) Nabeshima et al. use a light detector to provide feedback control for the lamp drive signal, instead of using detected ambient temperature, as in the present invention.

Nabeshima et al. detect the lamp tube wall temperature so that the lamp temperature can be regulated over a period of time by a heater. Specifically, Nabeshima et al. states in col. 6, lines 21-28:

"In order to suppress this fluctuation in light quantity, a heater 217 is wound around the fluorescent lamp 215, and this *heater 217 is controlled by temperature control circuit 218B based on a signal from a temperature sensor 218A*, such as a thermistor or the like, for detecting the tube wall temperature, thereby maintaining the tube wall temperature within a specified temperature range."

Hence, Nabeshima et al. teach away from detecting ambient temperature and teach away from using detected ambient temperature to control the lamp drive signal, as required in present claims 1 and 7.

Nabeshima et al. completely lacks any teaching or suggestion to use detected temperature to control the drive signal for the lamp. Instead, Nabeshima et al. teach that a

light detector senses the light output of the lamp, and the amount of sensed light is used to control the lamp drive signal. For example, Nabeshima states in col. 6, lines 51-55:

"The lighting control inverter 216 is controlled by a digital control signal (indicative of a lighting control value) from a CPU 28 to thereby change a value of a lamp current to be supplied to the fluorescent lamp 215. The digital control signal represents a light quantity level...".

The claims of Nabeshima et al. also teach that the lamp drive signal is controlled in response to the amount of light detected from the lamp. Hence, in this additional way, Nabeshima et al. teach away from using ambient temperature to control lamp drive signal or power.

Nabeshima et al. does mention that lamp light output is affected by the temperature of the lamp, or by ambient temperature at start-up (see for example col. 12 lines 36-39 and lines 58-67 and col. 26 lines 1-7). However, Nabeshima teaches that these temperature-dependent variations in lamp output are compensated for by the light-output detector feedback, not by detecting and compensating for ambient temperature, as in the present invention. Specifically, Nabeshima et al. states in col. 26, lines 15-24:

"Then it is difficult to correctly know the tube wall temperature (ambient temperature) at the time of reading the document. Therefore, the light quantity is corrected so that the light quantity variation during the document read falls within the image quality guarantee tolerance..."

Hence, Nabeshima et al. relies on light detection and control to compensate for variations in lamp output caused by temperature changes. Nabeshima et al. teach away from using ambient temperature detection to control the lamp drive signal, as required in present claims 1 and 7.

Nabeshima et al. in col. 16, line 66, and col. 26, line 5 discuss the 'ambient' temperature, but, according to the description of Nabeshima et al., the 'ambient' temperature is equivalent to the lamp tube wall temperature. This is very different from the meaning of the term 'ambient' as used in the present specification and claims, where 'ambient temperature' is the temperature in the absence of heating by the lamp or other devices. The 'ambient temperature' according to the present invention and present claims

therefore excludes the temperature of the lamp tube wall. The temperature detector of the present invention and claims cannot be located on or near the lamp tube wall.

In view of the above arguments, Nabeshima et al. is very different from the present invention, and teaches away from the present invention in several important aspects. Nabeshima et al. fails to meet the specific limitations of claims 1 and 7 requiring ambient temperature detection to control the lamp drive signal. Hence, The Examiners rejections of claims 1 and 7 are erroneous and must be withdrawn.

Claim 6 includes the limitation of "...an impedance detection circuit for detecting an impedance between electrodes of said cold-cathode-tube light source...", and a control circuit for "controlling a drive signal according to detected impedance information...". The Examiner erroneously argues that it would have been obvious to modify Nabeshima et al. to have an impedance detection circuit. While it is true that voltage, current and frequency can be used to calculate impedance, Nabeshima et al. do not provide any teaching or suggestion whatsoever of measuring or detecting the voltage or current provided to the lamp for detecting impedance or for controlling the lamp drive signal. Instead, Nabeshima et al. *control the applied* voltage or current to adjust lamp light output, and this is done in response to a signal from a *light detector*, not a voltage, current or impedance detector.

Also, the invention of Nabeshima et al. would not operate as intended if the temperature sensor of Nabeshima et al. were replaced with a lamp-impedance detector, as suggested by the Examiner. This is because an impedance detector could not provide temperature measurement required for feedback control of the heater in order to stabilize lamp temperature, as described by Nabeshima et al. in col. 6, lines 22-29.

Furthermore, even a successful substitution of an impedance detector for the temperature detector of Nabeshima et al. would not meet the limitations of claim 6, because the temperature sensor of Nabeshima et al., (and the substituted impedance detector) is not used for control of the lamp drive signal, as required by present claim 6.

Nabeshima et al. therefore do not meet the limitations of claim 6, and cannot be changed as suggested by the Examiner to meet the limitations of claim 6. Hence the rejection of claim 6 must be withdrawn. The Examiner is respectfully reminded that a

rejection cannot be made based on hindsight gleaned from the applicants specification (see MPEP 2141.01-III).


Regarding claims 5 and 11, Nabeshima et al. does not teach or suggest using frequency of an applied drive signal to control lamp light output.

5 In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1-11 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or
10 personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees for the petition or for entry of this amendment to Attorney's Deposit Account No. 50-2041
15 (Whitham, Curtis & Christofferson P.C.).

Respectfully submitted,


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APPENDIX 1

Clean copies of the amended sections of the specification:

5 The paragraph beginning at page 7, line 21 now reads as follows:

A1
A cold-cathode-tube light source 2, as shown in Fig. 2, is mounted within the scanner 1. The light from the cold-cathode-tube light source 2 is reflected back from the surface A of a document to be read. The reflected light is repeatedly reflected between mirrors 3a and 3b and enters into the photoelectric conversion element 5 via the lens 4.

10 The scanner 1 is provided with a roller 6 for smoothing the movement.

The paragraph beginning at page 8, line 15 now reads as follows:

A2
Referring to Fig. 3, the temperature control circuit is configured of a switch 10, a boosted-voltage conversion circuit 12, a temperature detection circuit 20, a dimmer control circuit 13, and a control circuit 17. The boosted-voltage conversion circuit 12 boosts a DC voltage of 12 volts (V) from a power source (not shown) and converts it into a high-frequency signal b of 50KHz. The temperature detection circuit 20 consists of the thermistor 15 for ambient temperature detection and the correction circuit 16. The dimmer control circuit 13 changes the high-frequency signal b from the boosted-voltage
20 circuit 12 according to a temperature detected by the thermistor 15 to produce the drive signal c, thus performing dimmer control to change luminance of the cold-cathode-tube light source 2.

The paragraph beginning at page 15, line 2 now reads as follows:

A3
25 Maintaining the luminance constant, independent of the ambient temperature, allows the peak follower circuit arranged in the prior art image processing circuit to be eliminated so that the cost reduction of the whole system can be realized. Moreover, the resultant effect is that the S/N ratio of an image signal becomes constant independently of the ambient temperature and that deterioration in image quality is small.

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The paragraph beginning at page 19, line 3 (ABSTRACT) now reads as follows:

A4
5 The scanner includes the switch 10 that is closed when a document is read, the boosted-voltage conversion circuit 12 that boosts a DC voltage of 12 volts (V) supplied from a power source (not shown) and then converts it into a high-frequency signal b of 50 KHz, the temperature detection circuit 20 formed of the thermistor 15 for ambient temperature detection and correction circuit 16, and the dimmer control circuit 13 that varies the high-frequency signal b from the boosted-voltage conversion circuit 12 according to a temperature detected by the thermistor 15 and produces a drive signal c to vary the luminance of the cold-cathode-tube light source 2.

APPENDIX 2Clean copies of the amended claims:

1. A scanner comprising:

5 a cold-cathode-tube light source for illuminating a surface of a document;
 a photoelectric conversion element for receiving light reflected from the surface of
AP said document and producing an image signal;
 a temperature detection circuit for detecting an ambient temperature; and
 a control circuit for controlling a drive signal according to detected ambient
10 temperature, said drive signal illuminating said cold-cathode light source when said
document is read.

7. A method of controlling a drive signal for illuminating a cold-cathode-tube light source comprising the steps of:

15 detecting an ambient temperature and
 controlling a drive signal based on said detected ambient temperature, said drive
signal illuminating said cold-cathode-tube light source when said document is read.
